



PLASTIC DEBRIS USAGE BY TUBE-BUILDING POLYCHAETE Diopatra cuprea COMPLEX

Uso de lixo plástico pelo complexo de espécies do poliqueta tubícola
Diopatra cuprea

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ABSTRACT

In this short note the plastic debris usage by tube-building polychaete *Diopatra cuprea* complex in the tube caps decoration is reported for the first time. Soft plastics attached to tube caps were recorded at a tidal flat in the Sergipe River estuary, northeastern Brazil. This interaction probably reflects an adaptation of this polychaete to a highly polluted environment.

Keywords: pollution, soft plastics, tube caps, decoration.

RESUMO

Nesta nota breve, o uso de lixo plástico na decoração dos tubos do complexo de espécies do poliqueta Diopatra cuprea é registrado pela primeira vez. Pedacos de plásticos moles aderidos às aberturas dos tubos do poliqueta foram registrados em um plano de maré localizado no estuário do rio Sergipe, Nordeste do Brasil. Essa interação provavelmente reflete uma adaptação da espécie a um ambiente altamente poluído.

Palavras-chave: poluição, plásticos moles, tubos, decoração.

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Plastic pollution is nowadays one of main concerns to the marine environment, where ingestion and entanglement have been reported as the main deleterious impact on marine life (Derraik, 2002; Costa et al., 2022). Nevertheless, some works investigated interaction between behavior and use of marine debris as a resource or tool by marine fauna. For instance, *Lytechinus variegatus* is a very common sea urchin on shallow sand bottoms of tropical and subtropical western Atlantic, which has a covering behavior. Recently, a field experiment showed that *L. variegatus* uses more marine debris than natural items as cover (Barros et al., 2020). In the sandy beaches, the presence of marine debris, mainly soft plastic, straw, rope and foam, around ghost crab burrows has been reported (Costa et al., 2018). According to the authors, the debris usage by the crab is a mechanism to help it to memorize the burrow placement. Marine debris has also been used by seabirds as nesting materials (Lavers; Hodgson & Clarke, 2013; Tavares et al., 2016).

The onuphid polychaetes in the genus *Diopatra* are important ecosystem engineers in soft-bottom habitats (Peckol & Baxter, 1986; Berke, 2012, 2022). Along western Atlantic, *Diopatra cuprea* is the most well-documented species inhabiting intertidal and shallow subtidal habitats (see Berke, 2022). However, this taxon is nowadays considered a species complex and, in a recent study, four new species previously identified as *D. cuprea* were described for the Brazilian coast (Seixas et al., 2021). These polychaetes build deep vertical tubes emerging 2-5 cm above the sediment surface in a hook-shaped tube cap to which the worm actively attaches shell fragments, detritus, and algae (Berke & Woodin, 2008; Berke, 2012, 2022; Mott et al., 2022). Such tube caps are called ornamented or decorated (Berke; Miller & Woodin, 2006). There are some hypotheses regarding the function for tube caps decorations which are mainly associated with reduction of predation risk or increase of feeding (see Berke & Woodin, 2008). The mechanisms behind the choice of material used in the tube decoration is also unclear. Myers (1972) found that *D. cuprea* prefers 'tabular' materials such as bits of shells or flakes of shale and the size of materials used is determined only by the ability of the worm to move them. Indeed, a wide variability in the tube caps decoration patterns has been observed, which are often attributed to local environmental conditions as hydrodynamics and kind of available materials (Myers, 1972; Berke, 2012; Mott et al., 2022).

On September 29th of 2022, during a field work carried out at a sandy tidal flat situated close to estuarine mouth of Sergipe River (Figure 1), some tube caps of *D. cuprea* complex were recorded. These tube caps were decorated mainly with vegetal fragments from nearby mangroves but, surprisingly, most of them also had some kind of soft plastic attached to them (Figure 2). Thus, this observation corresponds to the first record of plastic debris usage for tube building polychaete and more specifically by *Diopatra cuprea* complex tube caps decoration.

Figure 1 - Map of the Sergipe River estuary indication of the study area. In detail, satellite image of the tidal flat where the records were made (Map data 2022 © Google)

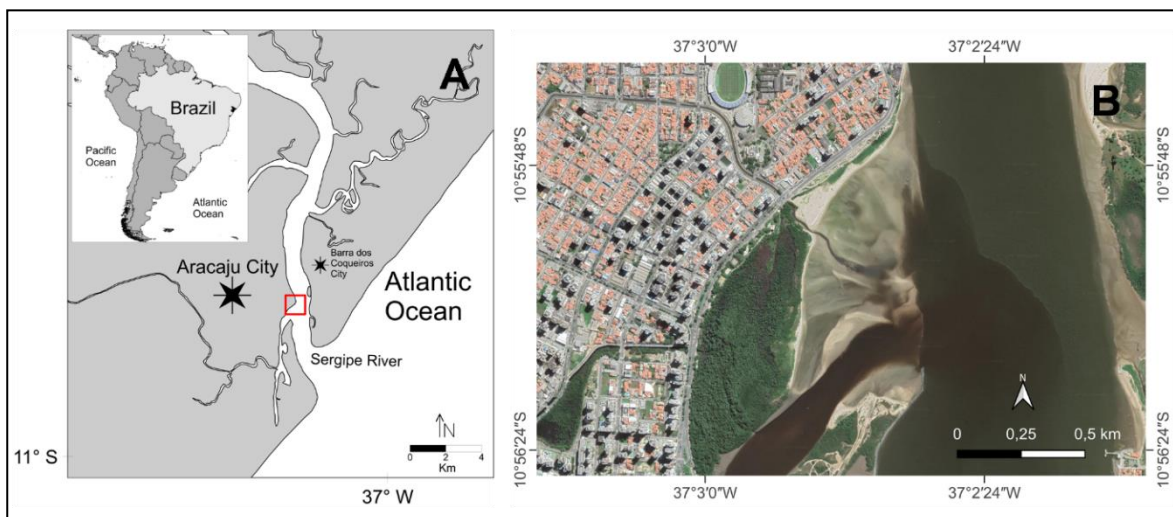
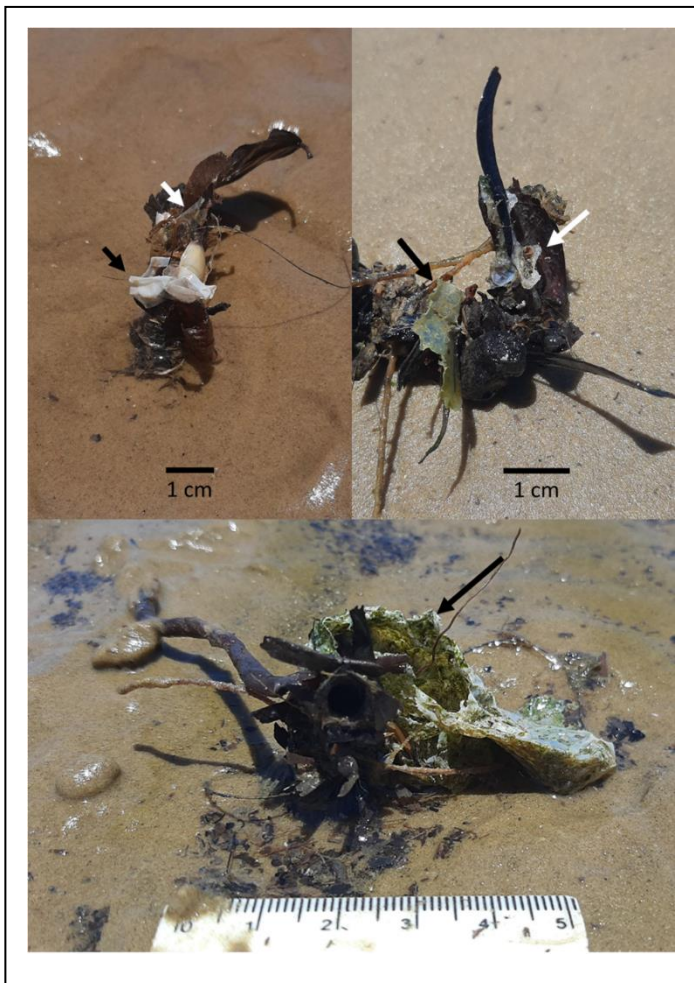


Figure 2 – Tube caps of the *Diopatra cuprea* complex decorated with soft plastics (arrows) recorded at Sergipe River estuary, northeastern Brazil



The Sergipe River is the most polluted estuary of the coast of the state of Sergipe, directly receiving industrial and domestic sewage from Aracaju city, capital of state, and metropolitan region (Alves; Passos & Garcia, 2007). The presence of plastic debris is common in both water and sediments in this region. Thus, it is quite plausible that plastic debris usage in tube cap decoration by *Diopatra cuprea* complex is due to higher availability of this material in the local environment and, consequently, camouflage with these debris might be a good strategy. Furthermore, the presence of plastic debris in the tube caps could be used as a pollution indicator.

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